US 20060120402A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2006/0120402 A1

Gallant (43) Pub. Date: Jun. 8, 2006

(54) METHOD FOR RUNNING AN X.25-BASED APPLICATION ON A SECOND PROTOCOL-BASED NETWORK

(76) Inventor: **Paul Gallant**, Deux-Montagnes (CA)

Correspondence Address:
OGILVY RENAULT LLP
1981 MCGILL COLLEGE AVENUE
SUITE 1600
MONTREAL, QC H3A2Y3 (CA)

(21) Appl. No.: 11/005,295

(22) Filed: Dec. 7, 2004

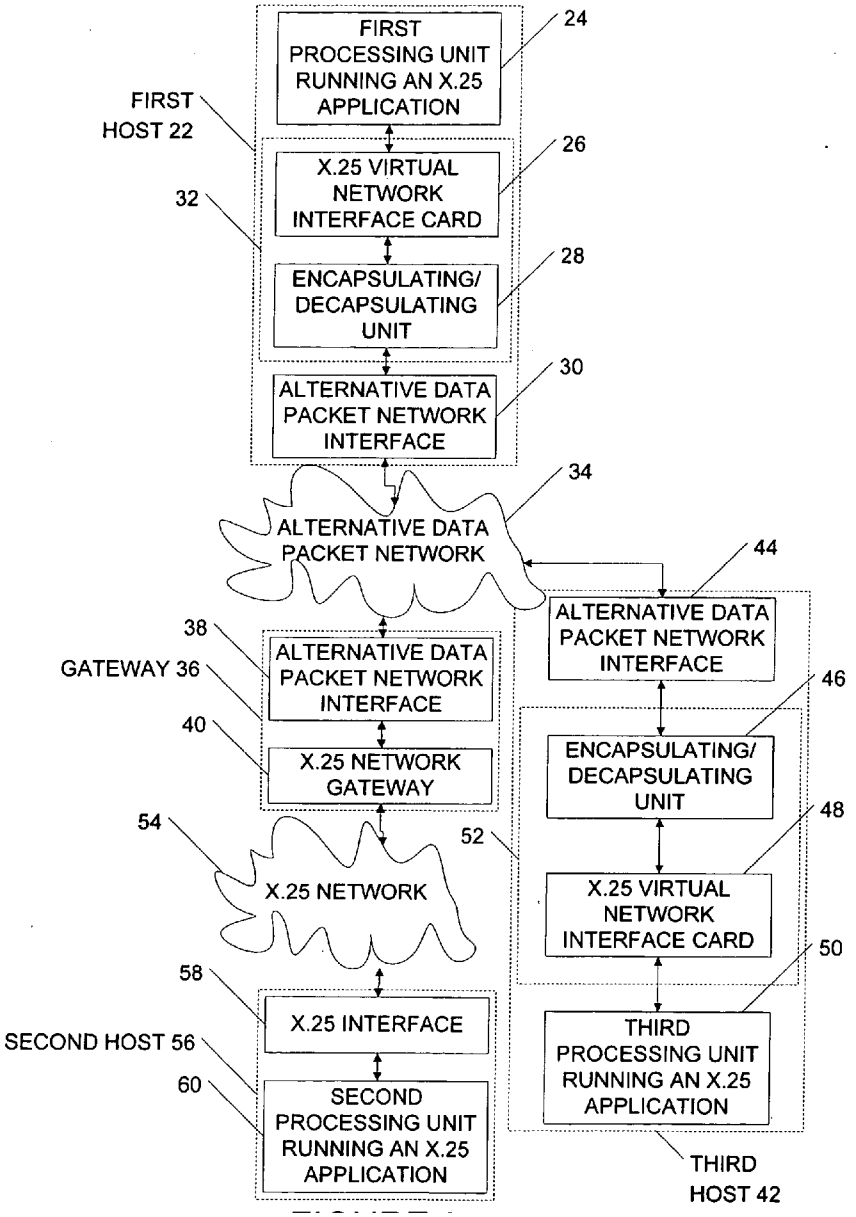
Publication Classification

(51) Int. Cl.
H04L 12/56 (2006.01)
H04J 3/16 (2006.01)

(52) U.S. Cl. 370/466; 370/389

(57) ABSTRACT

A method is disclosed for enabling an application communicating using a first communication protocol to communicate with a physical network interface communicating using a second communication protocol wherein a driver is installed for providing a virtual first communication protocol interface card.



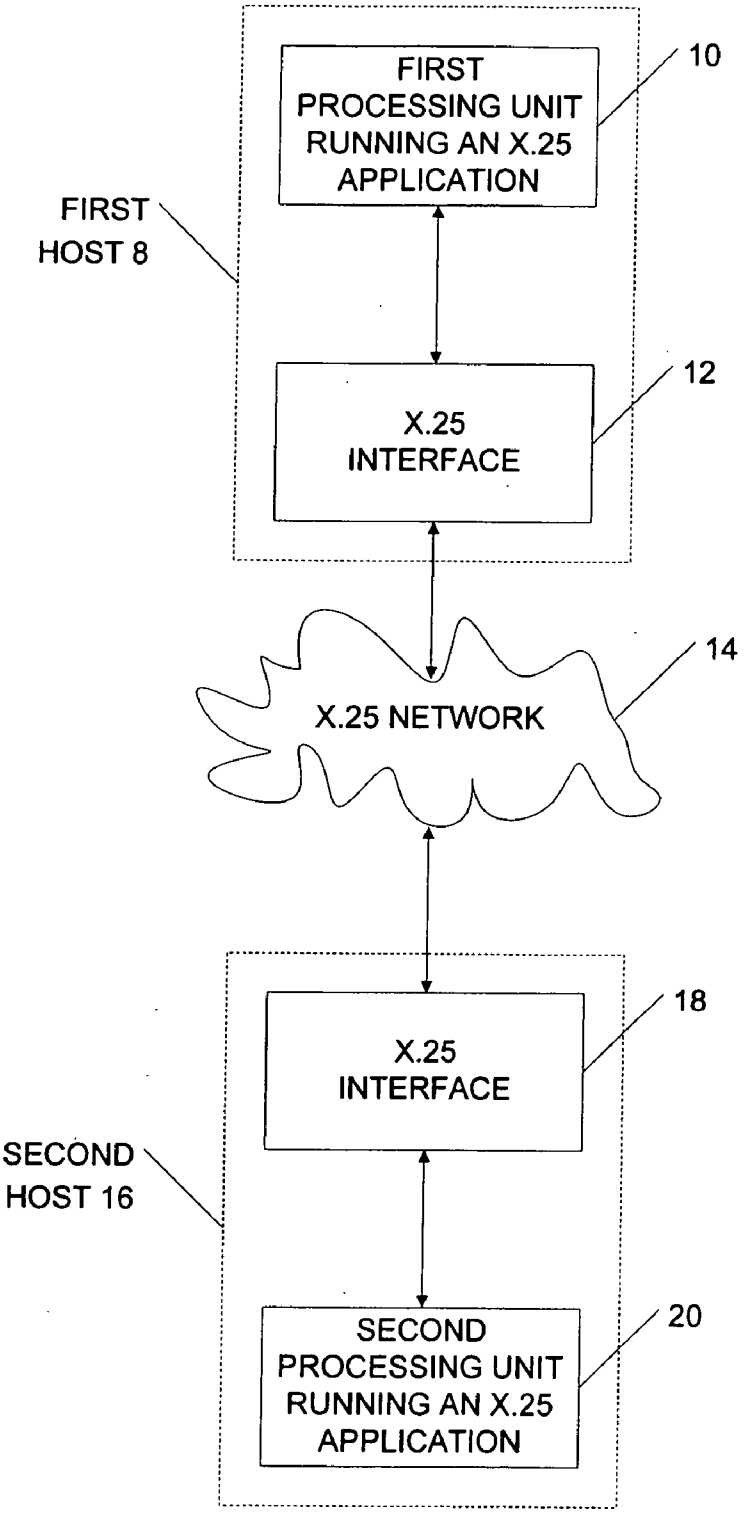


FIGURE 1
(PRIOR ART)

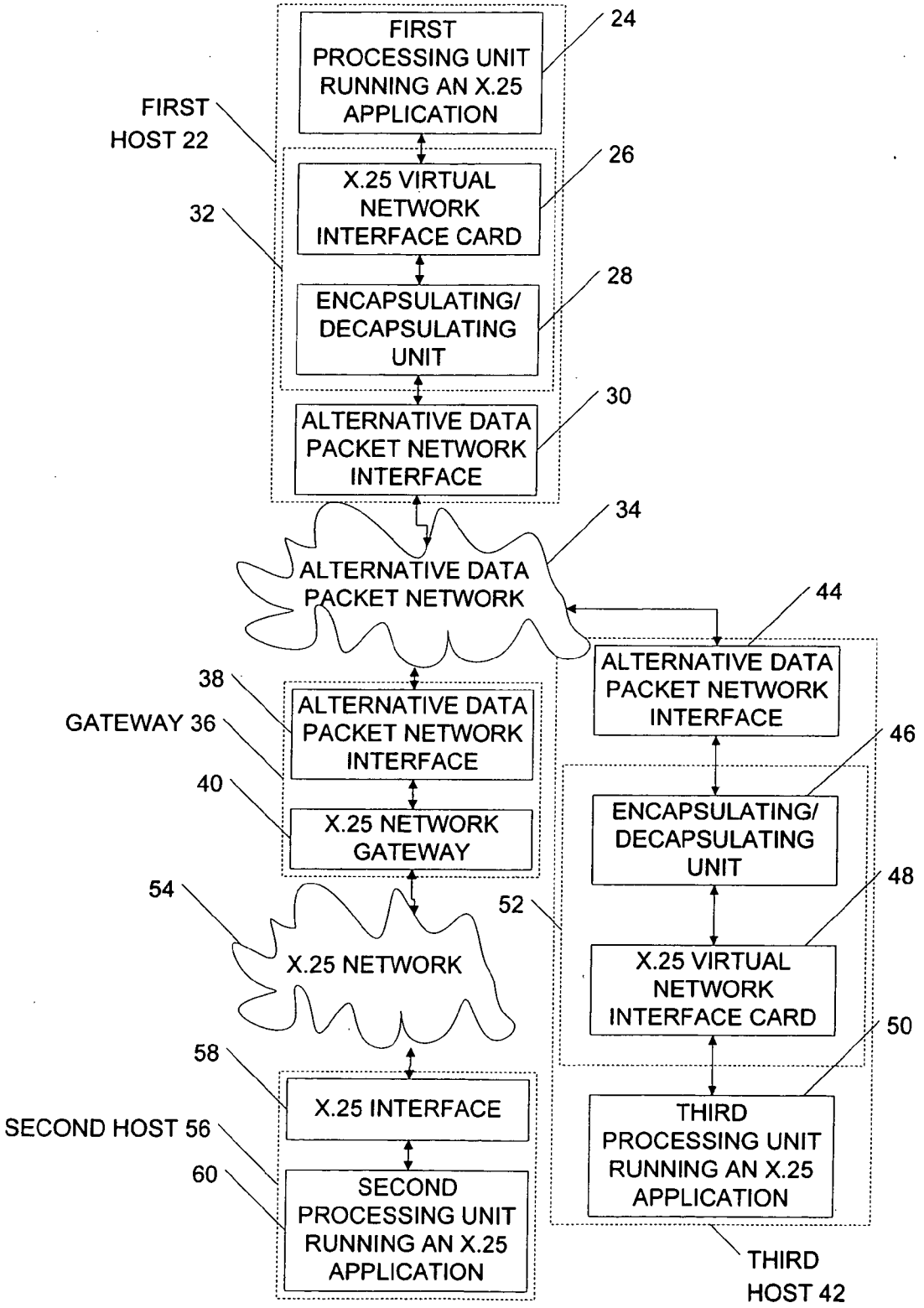

FIRST PROCESSING UNIT RUNNING AN X.25 APPLICATION
24
FIRST HOST 22
X.25 VIRTUAL NETWORK INTERFACE CARD
26
32
ENCAPSULATING/ DECAPSULATING UNIT
28
ALTERNATIVE DATA PACKET NETWORK INTERFACE
30
34
ALTERNATIVE DATA PACKET NETWORK
44
38
ALTERNATIVE DATA PACKET NETWORK INTERFACE
GATEWAY 36
ALTERNATIVE DATA PACKET NETWORK INTERFACE
46
40
X.25 NETWORK GATEWAY
ENCAPSULATING/ DECAPSULATING UNIT
48
54
52
X.25 NETWORK
X.25 VIRTUAL NETWORK INTERFACE CARD
50
58
X.25 INTERFACE
THIRD PROCESSING UNIT RUNNING AN X.25 APPLICATION
SECOND HOST 56
60
SECOND PROCESSING UNIT RUNNING AN X.25 APPLICATION
THIRD HOST 42

FIGURE 2

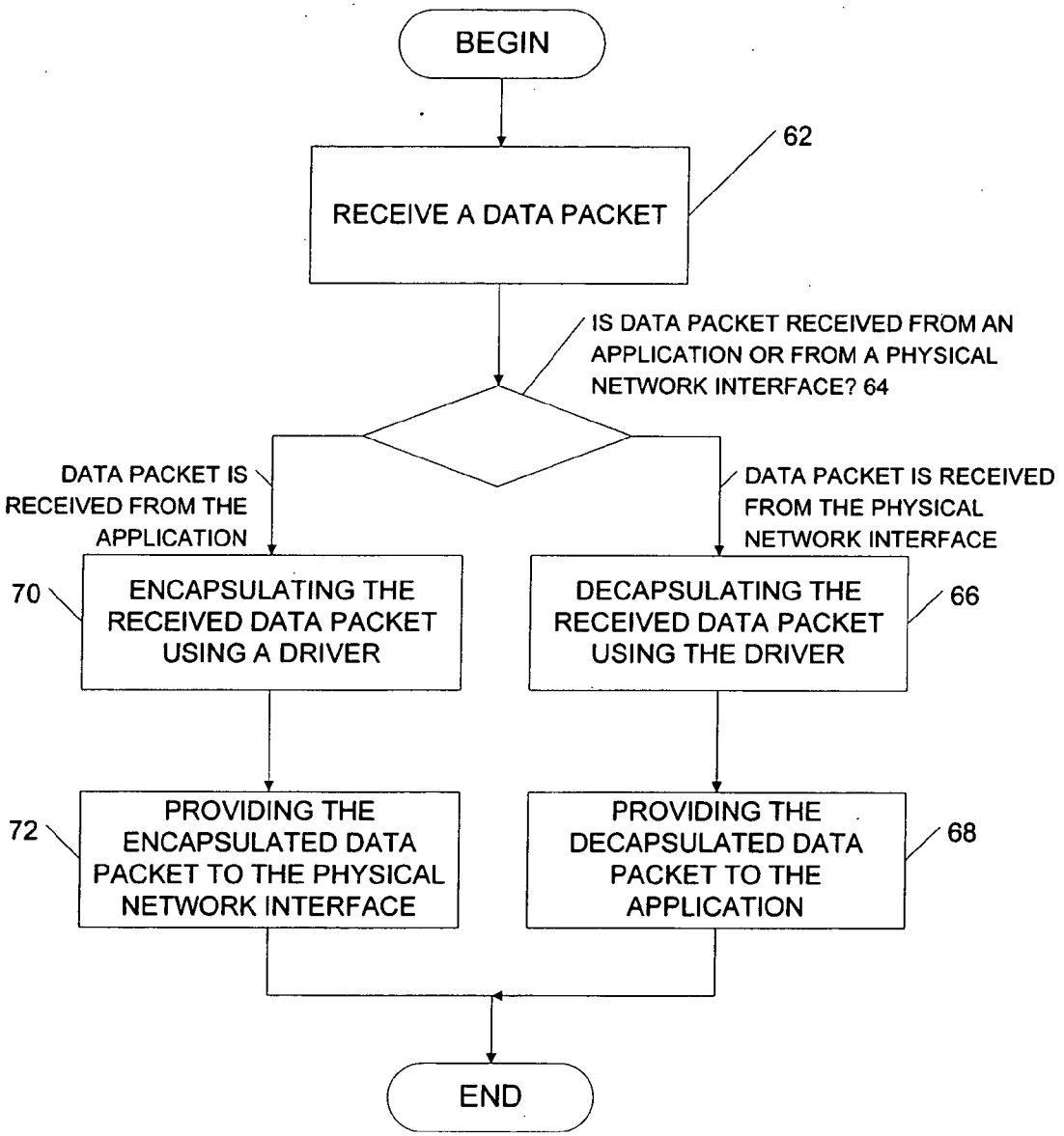

BEGIN
RECEIVE A DATA PACKET
62
IS DATA PACKET RECEIVED FROM AN APPLICATION OR FROM A PHYSICAL NETWORK INTERFACE? 64
DATA PACKET IS RECEIVED FROM THE APPLICATION
DATA PACKET IS RECEIVED FROM THE PHYSICAL NETWORK INTERFACE
70
ENCAPSULATING THE RECEIVED DATA PACKET USING A DRIVER
DECAPSULATING THE RECEIVED DATA PACKET USING THE DRIVER
66
72
PROVIDING THE ENCAPSULATED DATA PACKET TO THE PHYSICAL NETWORK INTERFACE
PROVIDING THE DECAPSULATED DATA PACKET TO THE APPLICATION
68
END

FIGURE 3

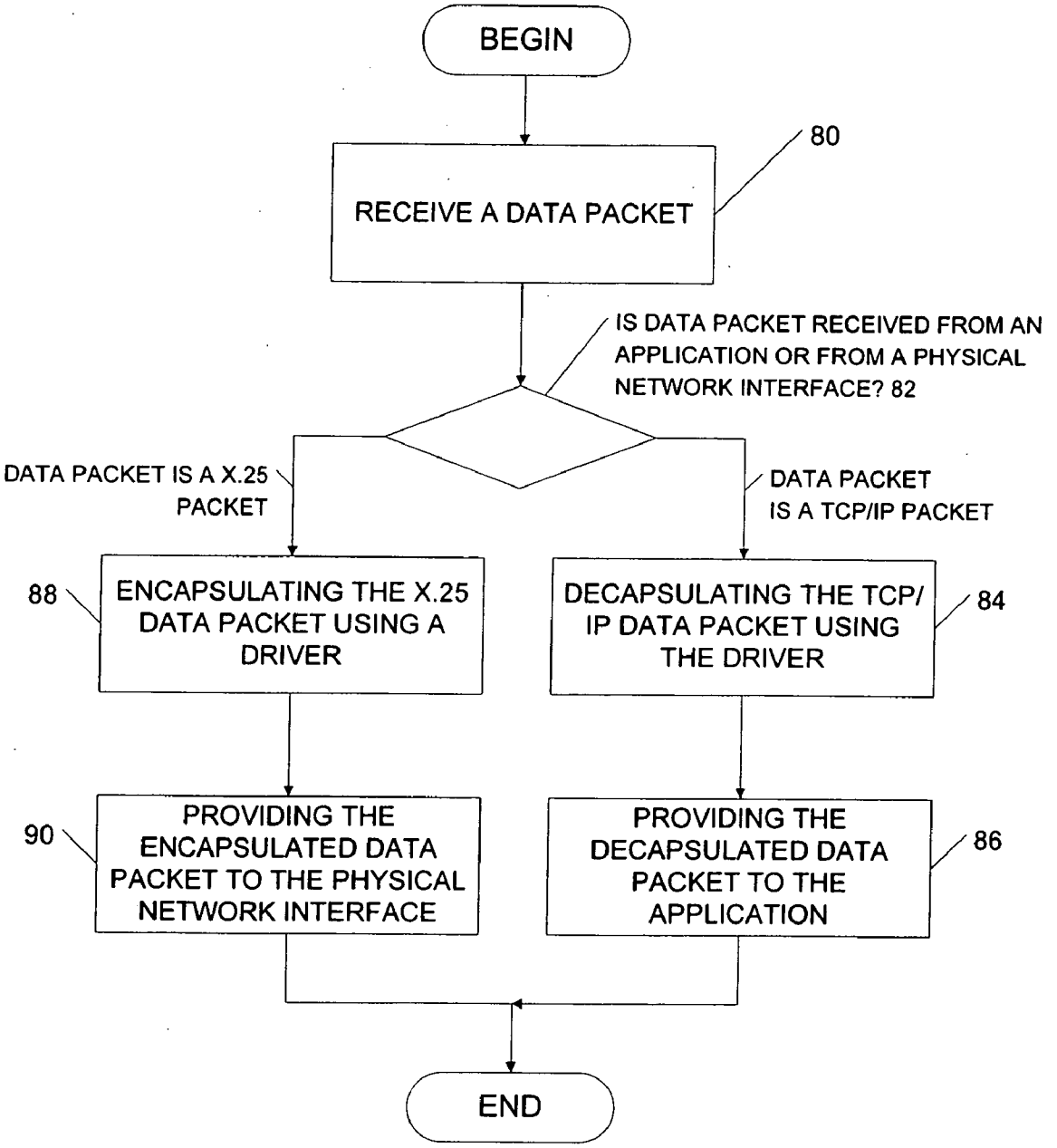

BEGIN
RECEIVE A DATA PACKET
80
IS DATA PACKET RECEIVED FROM AN APPLICATION OR FROM A PHYSICAL NETWORK INTERFACE? 82
DATA PACKET IS A X.25 PACKET
DATA PACKET IS A TCP/IP PACKET
88
ENCAPSULATING THE X.25 DATA PACKET USING A DRIVER
DECAPSULATING THE TCP/IP DATA PACKET USING THE DRIVER
84
90
PROVIDING THE ENCAPSULATED DATA PACKET TO THE PHYSICAL NETWORK INTERFACE
PROVIDING THE DECAPSULATED DATA PACKET TO THE APPLICATION
86
END

FIGURE 4

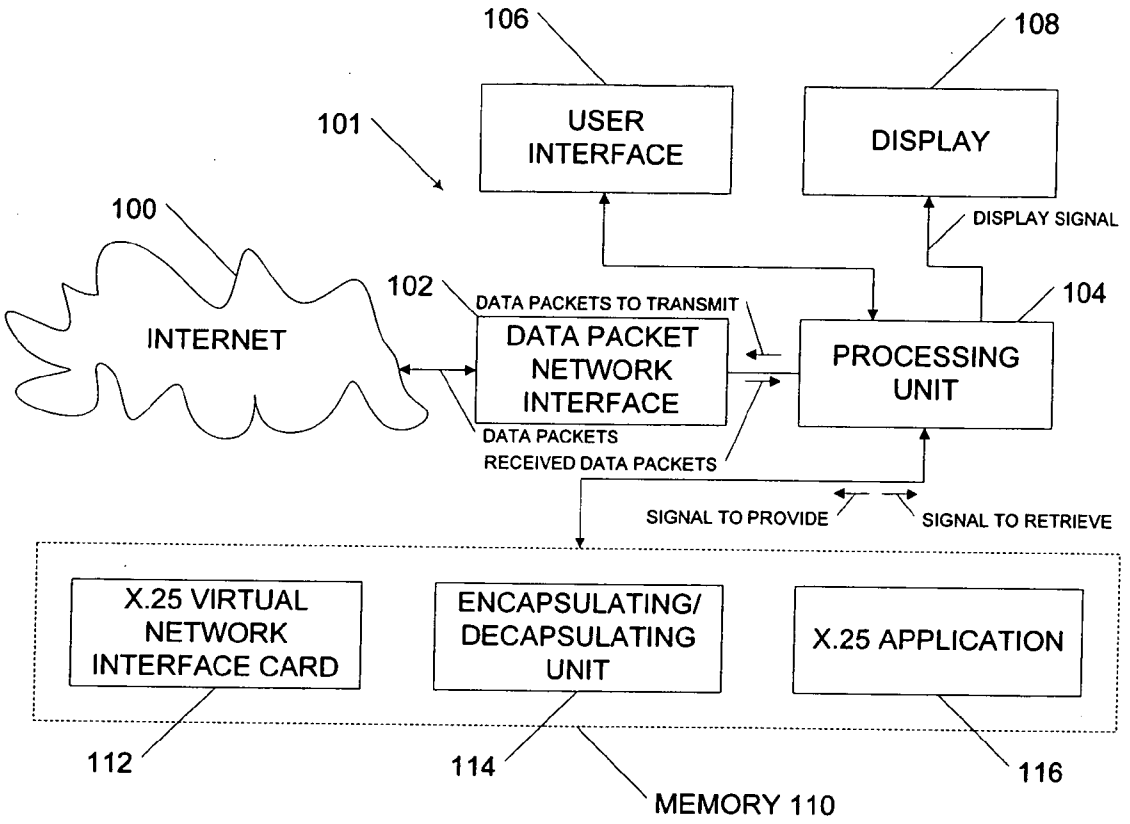

106
108
101
USER INTERFACE
DISPLAY
100
DISPLAY SIGNAL
102
DATA PACKETS TO TRANSMIT
104
INTERNET
DATA PACKET NETWORK INTERFACE
PROCESSING UNIT
DATA PACKETS
RECEIVED DATA PACKETS
SIGNAL TO PROVIDE
SIGNAL TO RETRIEVE
X.25 VIRTUAL NETWORK INTERFACE CARD
ENCAPSULATING/ DECAPSULATING UNIT
X.25 APPLICATION
112
114
116
MEMORY 110

FIGURE 5

METHOD FOR RUNNING AN X.25-BASED APPLICATION ON A SECOND PROTOCOL-BASED NETWORK

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This is the first application filed for the present invention.

TECHNICAL FIELD

[0002] The present invention relates to the field of networking. More precisely, this invention pertains to the field of network interface cards.

BACKGROUND OF THE INVENTION

[0003] Despite its age, the legacy X.25 communication protocol is still used with a large amount of applications around the world. For instance, various banking and telecommunication applications still use X.25-based applications.

[0004] Now referring to **FIG. 1**, there is shown a prior art embodiment where an X.25 communication protocol is used. In this embodiment, a first host **8** communicates with a second host **16** via an X.25 network **14**.

[0005] More precisely, the first host **8** comprises a first processing unit **10** running an X.25 application and an X.25 interface **12**. The X.25 application may be any type of applications. The X.25 interface **12** is adapted to connect the first processing unit **10** running an X.25 application to the X.25 network **14**.

[0006] The second host **16** comprises a second processing unit **20** running an X.25 application and an X.25 interface **18**. The X.25 application running on the second processing unit **20** may be any type of X.25 application. The X.25 interface **18** is adapted to connect the second processing unit running an X.25 application **20** to the X.25 network **14**.

[0007] Unfortunately, the cost of setting up data networks operating with the X.25 communication protocol is quite expensive in comparison to the cost for setting up data networks operating with other data packet protocols. Various solutions have been implemented for addressing this cost issue. For example a TCP/IP network may be used to transmit data packets.

[0008] The use of X.25 over TCP/IP, also known as XOT, tries to addresses this issue. Unfortunately using XOT leads to various drawbacks. For instance, it is known by the skilled addressee that TCP, which is used on XOT, requires an overhead for signaling. Furthermore, XOT is usually implemented on a dedicated network device (X.25 to IP gateway) which therefore requires extra hardware.

[0009] There is therefore a need for a method and apparatus that will overcome at least one of the above-identified drawbacks.

SUMMARY OF THE INVENTION

[0010] In one of its aspects, the invention provides a method for enabling an application communicating using a first communication protocol to communicate with a physical network interface communicating using a second communication protocol.

[0011] In another aspect, the invention provides a method for enabling an X.25 application to communicate over a non-X.25 data packet using a corresponding non-X.25 interface.

[0012] According to an embodiment of the invention, there is provided a method for enabling an application that uses a first communication protocol to communicate with a physical network interface that uses a second communication protocol, the method comprising providing a driver for simulating another network interface communicating with the first communication protocol, receiving a data packet from one of the application and the physical network interface, if the data packet is received from the application, using the driver to encapsulate the data packet according to the second communication protocol and providing the encapsulated data packet to the physical network interface and if the data packet is received from the network interface, decapsulating the data packet to provide a data packet suitable with the first communication protocol and providing the decapsulated data packet to the application using the driver.

[0013] According to another embodiment of the invention, there is provided a driver for enabling an application that uses a first communication protocol to communicate with a physical network interface that uses a second communication protocol, the method comprising a software implemented network interface card simulating a network interface card for the application operating according to the first communication protocol and an encapsulating/decapsulating unit encapsulating a first given received packet from the software implemented network interface card according to the second communication protocol and providing the encapsulated packet to the physical network interface; the encapsulating/decapsulating unit further decapsulating a second given received packet from the physical network interface according to the first communication protocol to provide a decapsulated packet and further providing the decapsulated packet to the application.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Further features and advantages of the present invention will become apparent from the following detailed description, taken in combination with the appended drawings, in which:

[0015] **FIG. 1** is a block diagram showing a prior art embodiment where a first host comprising a first processing unit running an X.25 application communicates with a second host comprising a second processing unit running another X.25 application using an X.25 network;

[0016] **FIG. 2** is a block diagram showing an embodiment of the invention in a system where a first host comprising a first processing unit running an X.25 application communicates with a second host comprising a second processing unit running an X.25 application and a third host comprising a third processing unit running an X.25 application;

[0017] **FIG. 3** is a flowchart showing a method for inter-protocol communication according to an embodiment of the invention;

[0018] **FIG. 4** is a flowchart showing a method for inter-protocol communication according to another embodiment

of the invention where a data packet is received either from an X.25 application or from a TCP/IP physical network interface; and

[0019] **FIG. 5** is a block diagram showing an embodiment of the invention where a host running an X.25 application communicates with another X.25 application over a TCP/IP network.

[0020] It will be noted that throughout the appended drawings, like features are identified by like reference numerals.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0021] Now referring to **FIG. 2**, there is shown an embodiment where a first host **22** communicates with a second host **56** and with a third host **42**.

[0022] More precisely, the first host **22** communicates with the second host **56** via an alternative data packet network **34**, a gateway **36** and an X.25 network **54**.

[0023] The first host **22** also communicates with the third host **42** via the alternative data packet network **34**.

[0024] The alternative data packet network **34** may comprise any type of data packet network such as a Local Area Network (LAN), a Metropolitan Area Network (MAN), a Wide Area Network (WAN) or the like. The data packet network **34** may further operate using any type of communication protocol outside of the X.25 protocol. Preferably, the alternative data packet network **34** is a Wide Area Network operating according to the TCP/IP communication protocol, such as the Internet.

[0025] More precisely, the first host **22** comprises a first processing unit running an X.25 application **24**, a driver **32** and an alternative data packet network interface **30**. The driver **32** comprises an X.25 virtual network interface card **26** and an encapsulating/decapsulating unit **28**.

[0026] The first processing unit running an X.25 application **24** may be any type of processing unit. In a preferred embodiment, the first processing unit comprises a Linux based system running a X.25 socket based application.

[0027] The alternative data packet network interface **30** may be any type of network interface adapted for communicating with the alternative data packet network **34**. In a preferred embodiment, the alternative data packet network interface **30** comprises an Ethernet interface using TCP/IP protocol stack.

[0028] As mentioned earlier, the driver **32** comprises an X.25 virtual network interface card **26** (software implemented network interface card) and an encapsulating/decapsulating unit **28**. The driver **32** is preferably installed in the volatile memory of the first host **22**.

[0029] In fact, the X.25 virtual network interface card **26** of the driver **32** may be a software module which is intended to simulate the presence of a X.25 network interface in the operating system of the first host **22**.

[0030] The encapsulating/decapsulating unit **28** of the driver **32** may be a software module which is intended to encapsulate data packets originating from the X.25 application into encapsulated data packets which are suitable to be transmitted on the alternative data packet network. It should be understood by the skilled addressee that the encapsulating comprises performing any ISO Layer **2** operations that are required for transmitting the data packet over the alternative data packet network **34**. On the X.25 virtual network interface card **26** side, the virtual interface provides support for X.25 sockets APIs for end-user applications to be able to make use of it. On the alternative data packet network interface **30** side, means are provided to configure destination address and other parameters (such windowing) for a given connection. It also comprises proper translation of X.25 SVC and PVC sessions into the alternate data packet session format (such as for example XOT).

[0031] Furthermore, the encapsulating/decapsulating unit **28** of the driver **32** is intended to decapsulate data packets received from the alternative data packet network interface **30** into data packets that are suitable to be used by the X.25 application.

[0032] The gateway **36** is adapted for bridging traffic between the alternative data packet network **34** and the X.25 network **54**. In this embodiment the gateway **36** comprises an alternative data packet network interface **38** which is connected to the alternative data packet network **34** and a X.25 network gateway **40** connected to the X.25 network **54** and further to the alternative data packet network interface **38**. The skilled addressee will appreciate that the gateway **36** may be provided according to various parameters such as bandwidth, security requirements or the like. In a preferred embodiment, the gateway **36** comprises an Eicon 1550 WAN Router.

[0033] The second host **56** comprises a X.25 interface **58** and a second processing unit running an X.25 application **60**. The second processing unit running an X.25 application **60** is connected to the X.25 network **54** using the X.25 interface **58**. The skilled addressee will appreciate that the X.25 interface **58** may be selected according to various parameters such as bandwidth, security requirements, guaranteed delivery, reliability and latency. In a preferred embodiment, the X.25 interface **58** comprises an Eiconcard S91.

[0034] The third host **42** is connected to the alternative data packet network **34**.

[0035] The third host **42** comprises an alternative data packet network interface **44**, a driver **52** and a third processing unit running an X.25 application **50**.

[0036] More precisely, the alternative data packet network interface **44** may be any type of network interface adapted for communicating with the alternative data packet network **34**. In a preferred embodiment, the alternative data packet network interface **44** comprises an Ethernet interface using TCP/IP protocol stack.

[0037] The driver **52** comprises an encapsulating/decapsulating unit **46** and an X.25 virtual network interface card **48**.

[0038] Similarly to the encapsulating/decapsulating unit **28** of the driver **32**, the encapsulating/decapsulating unit **46** is a software module which is intended to encapsulate data packets originating from the X.25 application into encapsulated data packets which are suitable to be transmitted on the alternative data packet network **34**. Again, it should be

understood by the skilled addressee that the encapsulating comprises performing any ISO Layer **2** operations that are required for transmitting the data packet over the alternative data packet network **34**.

[**0039**] Furthermore, the encapsulating/decapsulating unit **46** of the driver **52** is intended to decapsulate data packets received from the alternative data packet network interface **44** into data packets that are suitable to be used by the X.25 application.

[**0040**] The X.25 virtual network interface card **48** of the driver **52** is a software module which is intended to simulate the presence of a X.25 network interface in the operating system of the third host **42**. The virtual interface network card **48** provides support for X.25 sockets and Eicon ECNCB (Eicon X.25 Toolkit) APIs for end-user applications to be able to make use of it.

[**0041**] Now referring to **FIG. 3**, there is shown a first embodiment of the operation of a driver (such as **32** or **52** from **FIG. 2**). In this embodiment, a host is running a network application functioning according to a first given data packet protocol. The host is connected to a network operating according to a second given data packet protocol using a physical network interface.

[**0042**] According to step **62**, a data packet is received by the driver.

[**0043**] According to step **64**, a test is performed in order to find out if the data packet is received from the application or from the physical network interface.

[**0044**] In the case where the data packet is received from the application and according to step **70**, the received data packet is encapsulated using an encapsulation/decapsulation unit comprised in the driver according to the second given protocol to be used in the data network.

[**0045**] According to step **72**, the encapsulated data packet is provided to a physical network interface. The physical network interface is adapted to transmit data to the data network. The data packet is then transmitted over the data network via the physical network interface.

[**0046**] In the case where the data packet is received from the network interface and according to step **66**, the received data packet is decapsulated using the encapsulation/decapsulation unit of the driver. The data packet is decapsulated according to the first given protocol used by the application.

[**0047**] According to step **68**, the decapsulated data packet is provided to the application.

[**0048**] Now referring to **FIG. 4**, there is shown another embodiment where a host, running an X.25 application, is connected to a TCP/IP network using a TCP/IP network interface.

[**0049**] According to step **80**, a data packet is received.

[**0050**] According to step **82**, a test is performed in order to find out if the data packet is an X.25 packet or a TCP/IP packet. If the data packet is coming from the X.25 virtual network interface card, it is treated as a X.25 packet and, consequently it is encapsulated and forwarded via the TCP/IP session to the remote site. If the packet is coming from a real interface through the system IP stack with the system's destination IP address and port, the packet is decapsulated and forwarded to the application via the virtual NIC.

[**0051**] In fact, in the case where the data packet is a TCP/IP data packet and according to step **84**, the TCP/IP data packet is decapsulated in a data packet. The decapsulated data packet comprises a X.25 data packet.

[**0052**] According to step **86**, the X.25 data packet is provided to the X.25 application.

[**0053**] Furthermore, in the case where the data packet is an X.25 data packet and according to step **88**, the TCP/IP data packet is encapsulated in a data packet. The encapsulated data packet comprises a TCP/IP data packet.

[**0054**] According to step **90**, the encapsulated data packet is provided to the TCP/IP network interface.

[**0055**] Now referring to **FIG. 5**, there is shown an example of a host **101** running an X.25 application and communicating with another X.25 application over a TCP/IP network which is the Internet **100**.

[**0056**] The host **101** comprises a user interface **106**, a display unit **108**, a data packet network interface **102**, a processing unit **104** and a memory **110**.

[**0057**] The memory **110** comprises a driver comprising an X.25 virtual network interface card **112** and an encapsulating/decapsulating unit **114**, and an X.25 application **116**. The memory is connected to the processing unit **104**. More precisely, the processing unit **104** provides a signal to the memory **110** and receives a signal to retrieve from the memory **110**.

[**0058**] The user interface **106** is adapted to provide an interface to an operator of the host **101**. The user interface **106** is connected to the processing unit **104** of the host **101**. The user interface **106** may be at least one of a mouse, a keyboard or the like. Preferably, the user interface comprises a keyboard and a mouse. It should be appreciated that such system, depending on the end-user application may work in unattended mode without any user interface.

[**0059**] The display **108** is adapted to display a visual signal to an operator of the host **101**. The display receives a display signal which is provided by the processing unit **104**. The display **108** may be anyone of a CRT display, a plasma display or the like. In the preferred embodiment, the display **108** comprises a Cathode Ray Tube (CRT) display. It should be appreciated that such system, depending on the end-user application may work in unattended mode without any user interface.

[**0060**] The data packet network interface **102** is a physical network interface adapted for providing a network connection to the host **101**. The data packet network interface **102** receives a data packet to transmit from the processing unit **104** and provides at least one data packet to the internet **100**. The data packet network interface **102** further receives data packets from the internet **100** and provides a received data packet to the processing unit **104**. In the preferred embodiment, the data packet network interface **102** comprises an Ethernet interface using TCP/IP protocol stack.

[**0061**] The processing unit **104** is adapted for processing data according to the embodiment disclosed in **FIG. 4**.

[0062] It will be appreciated that the embodiment disclosed in **FIG. 5** is of great advantage as it enables the application to access the Internet without requiring a physical X.25 network interface. Furthermore, it will be appreciated that the X.25 virtual network interface card **112** and the encapsulating/decapsulating unit **114** may be installed at once or when desired.

[0063] While illustrated in the block diagrams as groups of discrete components communicating with each other via distinct data signal connections, it will be understood by those skilled in the art that the preferred embodiments are provided by a combination of hardware and software components, with some components being implemented by a given function or operation of a hardware or software system, and many of the data paths illustrated being implemented by data communication within a computer application or operating system. The structure illustrated is thus provided for efficiency of teaching the present preferred embodiment.

[0064] It should be noted that the present invention can be carried out as a method, can be embodied in a system, a computer readable medium or an electrical or electro-magnetic signal.

[0065] The embodiments of the invention described above are intended to be exemplary only. The scope of the invention is therefore intended to be limited solely by the scope of the appended claims.

We claim:

1. A method for enabling an application that uses a first communication protocol to communicate with a physical network interface that uses a second communication protocol, said method comprising:

providing a driver for simulating another network interface communicating with said first communication protocol;

receiving a data packet from one of said application and said physical network interface;

if said data packet is received from said application, using the driver to encapsulate said data packet according to said second communication protocol and providing said encapsulated data packet to said physical network interface; and

if said data packet is received from said network interface, decapsulating said data packet to provide a data packet suitable with said first communication protocol and providing said decapsulated data packet to said application using said driver.

2. The method as claimed in claim 1, wherein said first communication protocol comprises X.25.

3. The method as claimed in claim 2, wherein said second communication protocol comprises TCP/IP.

4. The method as claimed in claim 3, further comprising providing said encapsulated packet via said physical network interface to at least one of a Wide Area Network (WAN), a Metropolitan Area Network (MAN) and a Local Area Network (LAN).

5. The method as claimed in claim 4, wherein said Wide Area Network comprises the Internet.

6. The method as claimed in claim 1, wherein said driver is provided from at least one of a remote location and a local location.

7. A driver for enabling an application that uses a first communication protocol to communicate with a physical network interface that uses a second communication protocol, said method comprising:

a software implemented network interface card simulating a network interface card for said application operating according to said first communication protocol; and

an encapsulating/decapsulating unit encapsulating a first given received packet from said software implemented network interface card according to said second communication protocol and providing said encapsulated packet to said physical network interface; said encapsulating/decapsulating unit further decapsulating a second given received packet from said physical network interface according to said first communication protocol to provide a decapsulated packet and further providing said decapsulated packet to said application.

8. The driver as claimed in claim 7, wherein said first communication protocol comprises X.25.

9. The driver as claimed in claim 8, wherein said second communication protocol comprises TCP/IP.

* * * * *